What is Agro-Informatics?

AEC3012

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Agro-Informatics

Food and Agriculture Organization (FAO)

Agro-informatics connects information technology with the farm management, analysis and application of agricultural data to design more accurate and targeted agricultural interventions.

Examples of The Use of New Technology in Agriculture

Satellite Imagery
Remote Sensing
Geographic Information Systems (GIS)

Information and Technology in Agriculture

Information and Technology enable the transformation of data into actionable information.

Benefits of Agro-Informatics

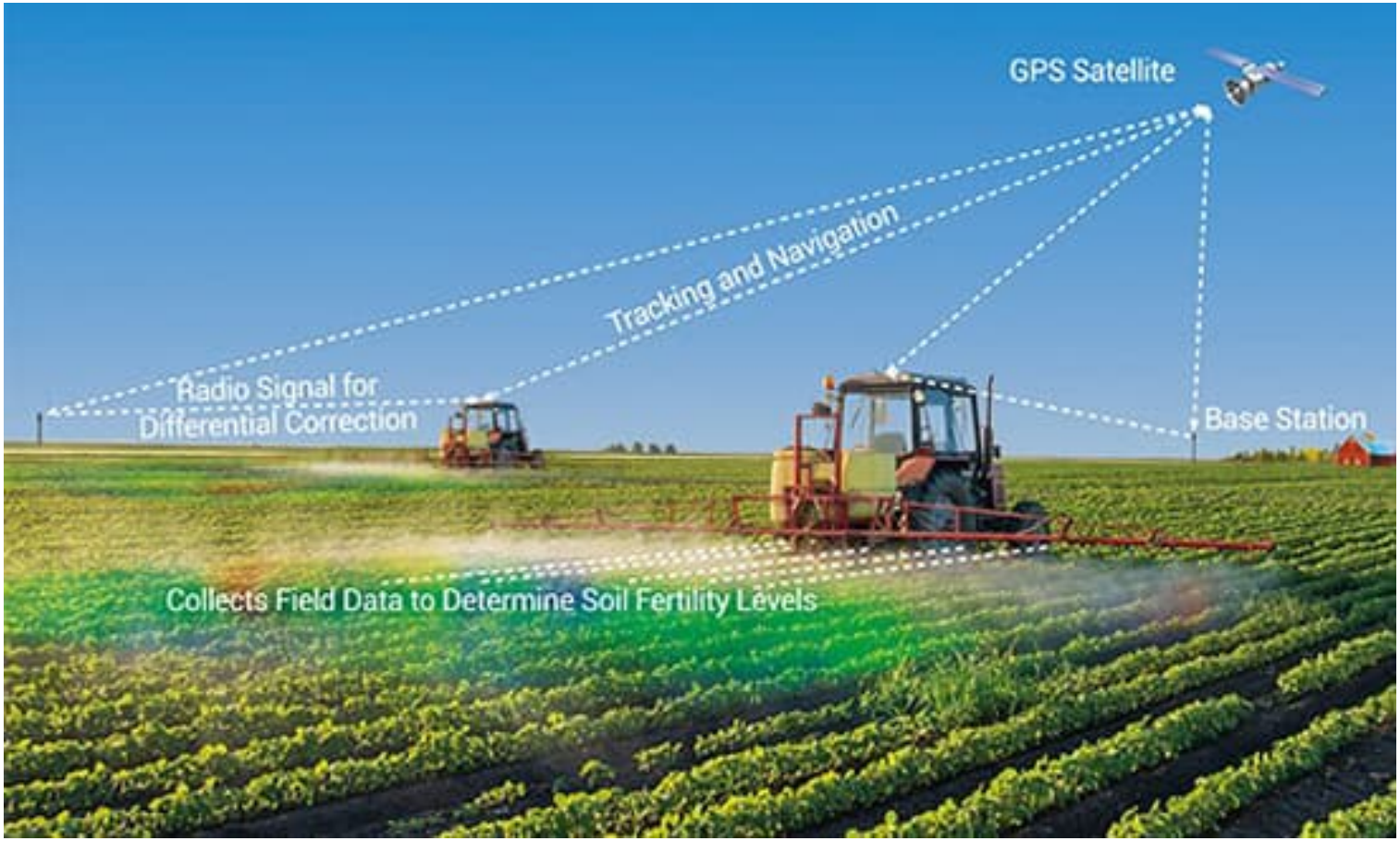
- Enhanced Decision Making: With real-time data on soil health, weather patterns, and crop growth, farmers can make informed decisions that maximize their yield.
- Resource Optimization: Agriculture informatics helps optimize the use of resources such as water, fertilizers, and pesticides, reducing waste and environmental impact.
- Precision Agriculture: Through GPS and remote sensing technologies, farmers can precisely target their interventions, minimizing costs and environmental harm.

Benefits of Agro-Informatics

- Early Disease Detection: Monitoring tools and data analysis enable the early detection of disease outbreaks, preventing their spread and minimizing losses.
- Supply Chain Efficiency: Informatics streamlines the supply chain, reducing post-harvest losses and ensuring fresher produce reaches consumers.

Example of Agro-Informatics

Example of Agro-Informatics



Example of Agro-Informatics

In this class,

- We will combine agricultural economics and computer science.
- We will learn about how to collect, store, and analyze a variety of data used in agriculutural econmics.

Data Collect

- A variety of sources of data and information related to agriculutral economics
- Statistics Korea, Bank of Korea, Government Agencies, AGRIX, etc
- International Agricultural Data (World Bank, FAO, etc)

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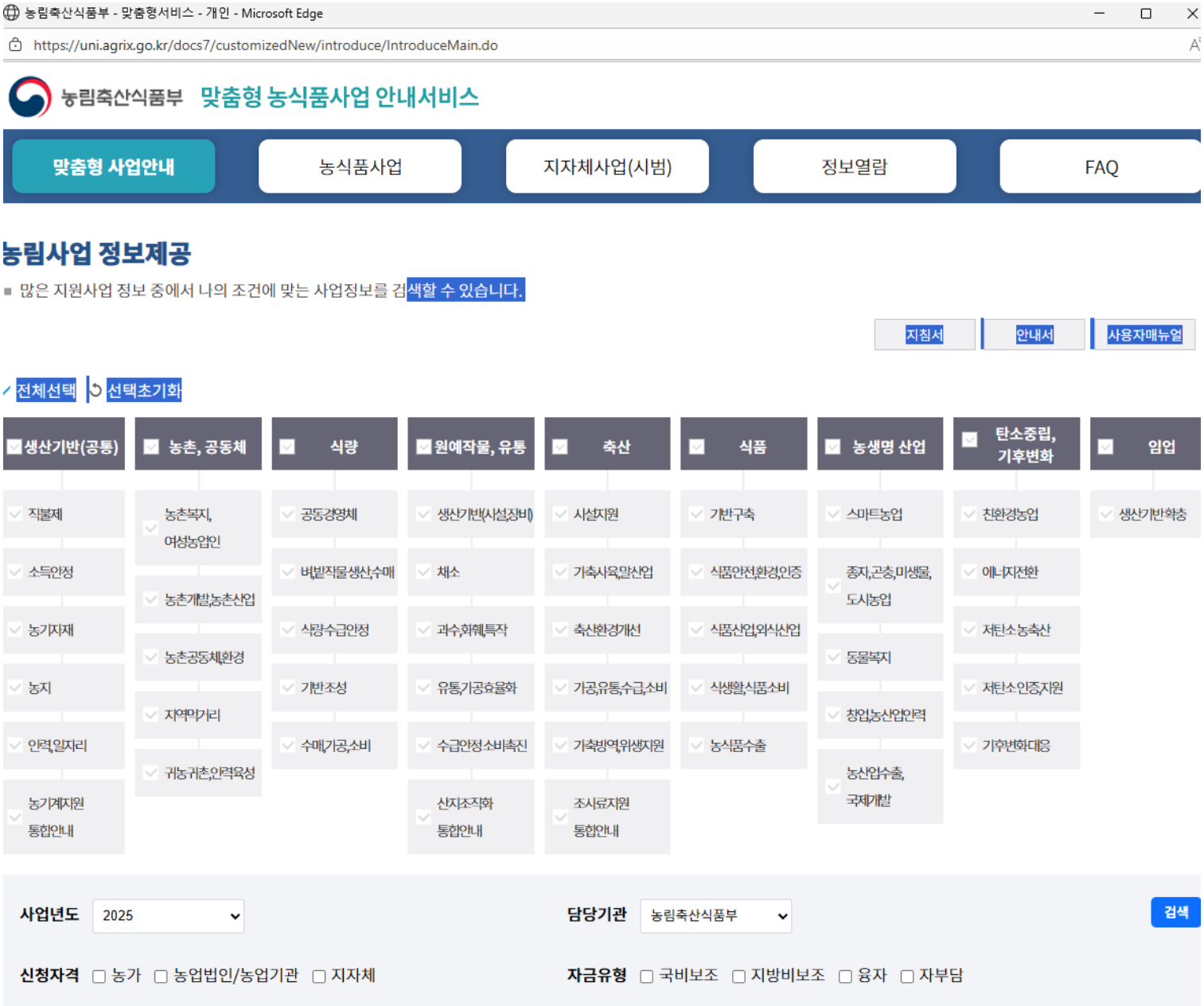
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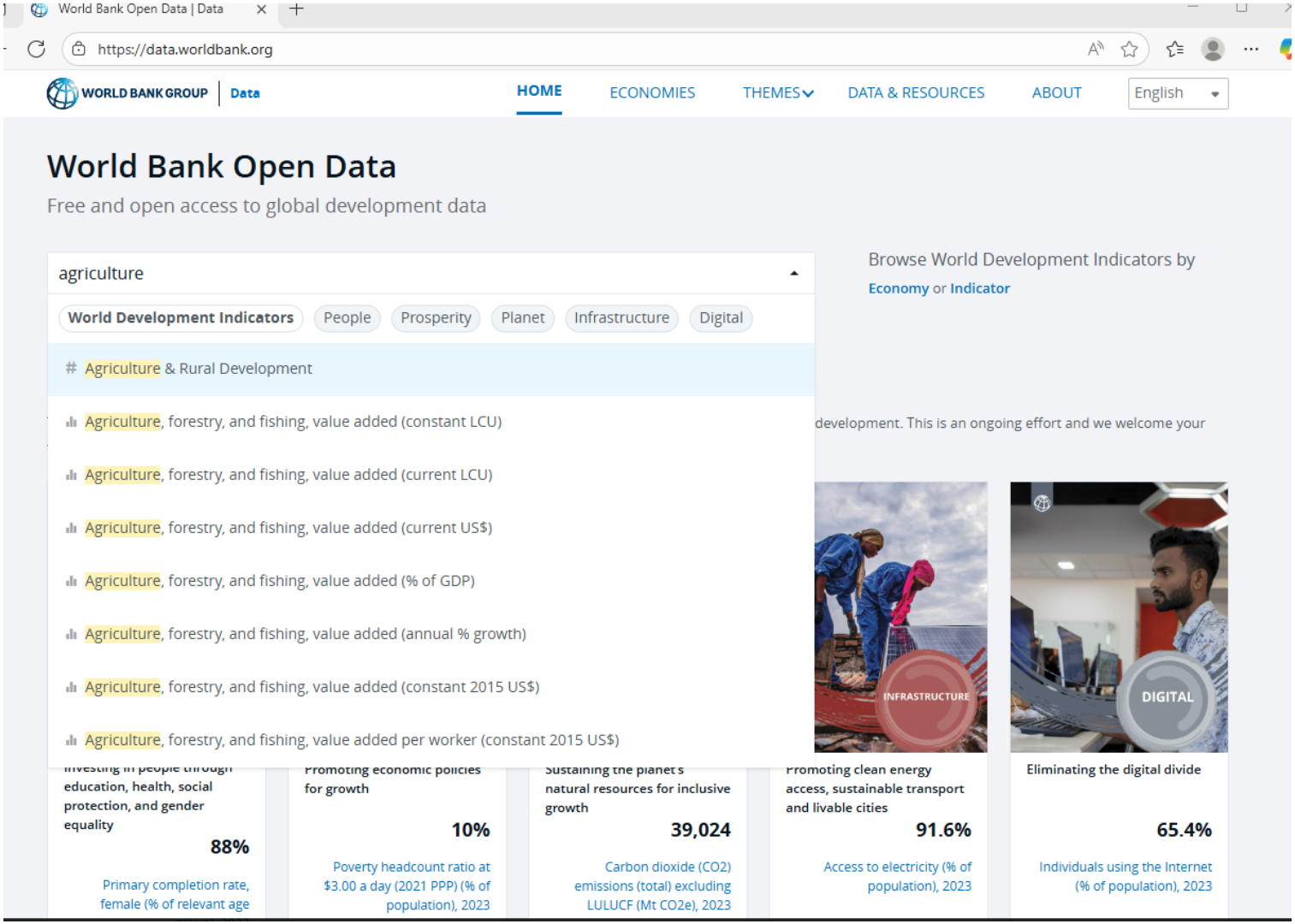
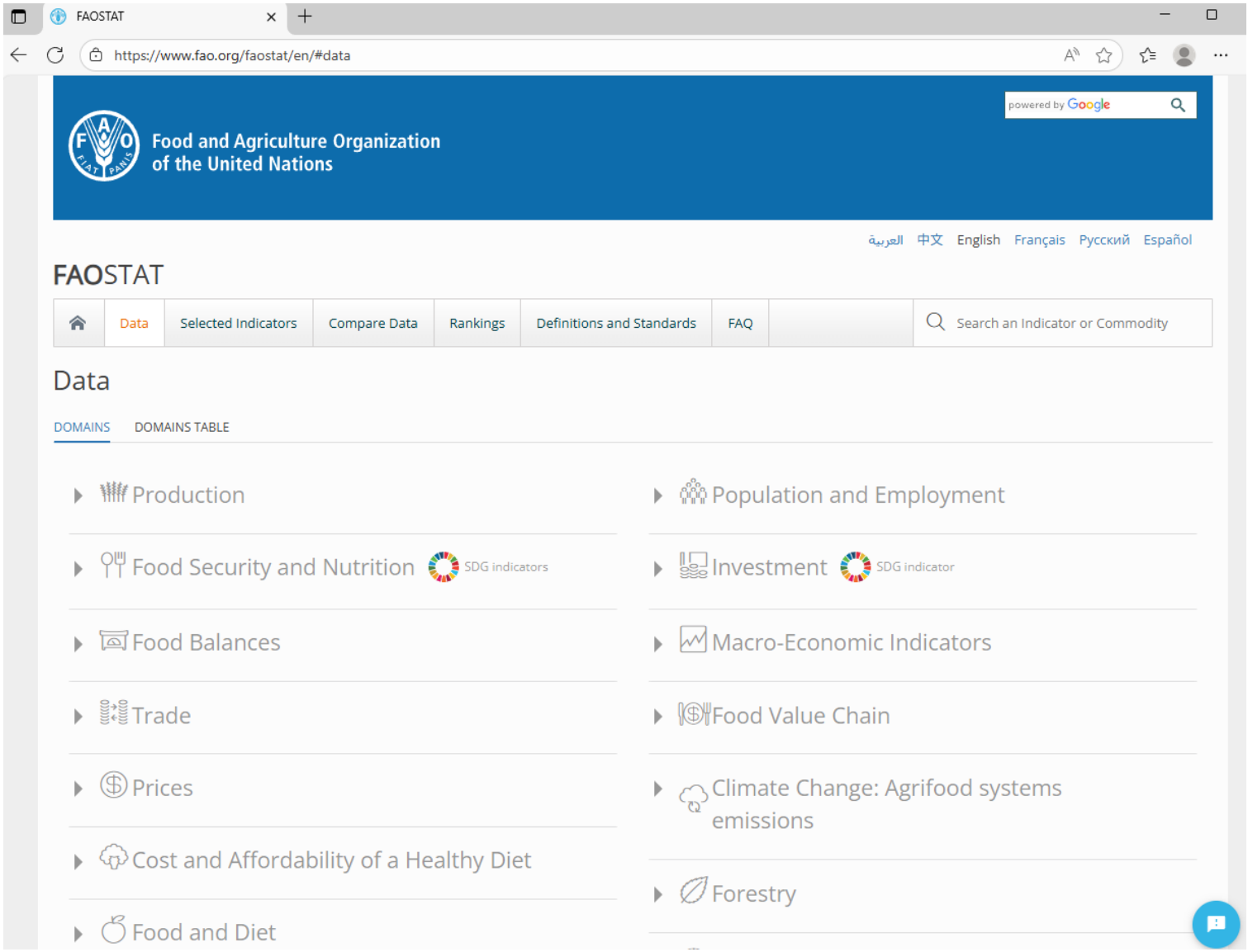
World Bank Open Data



FAOSTAT


FAOSTAT
https://www.fao.org/faostat/en/#data
powered by Google
Food and Agriculture Organization of the United Nations
العربية 中文 English Français Русский Español
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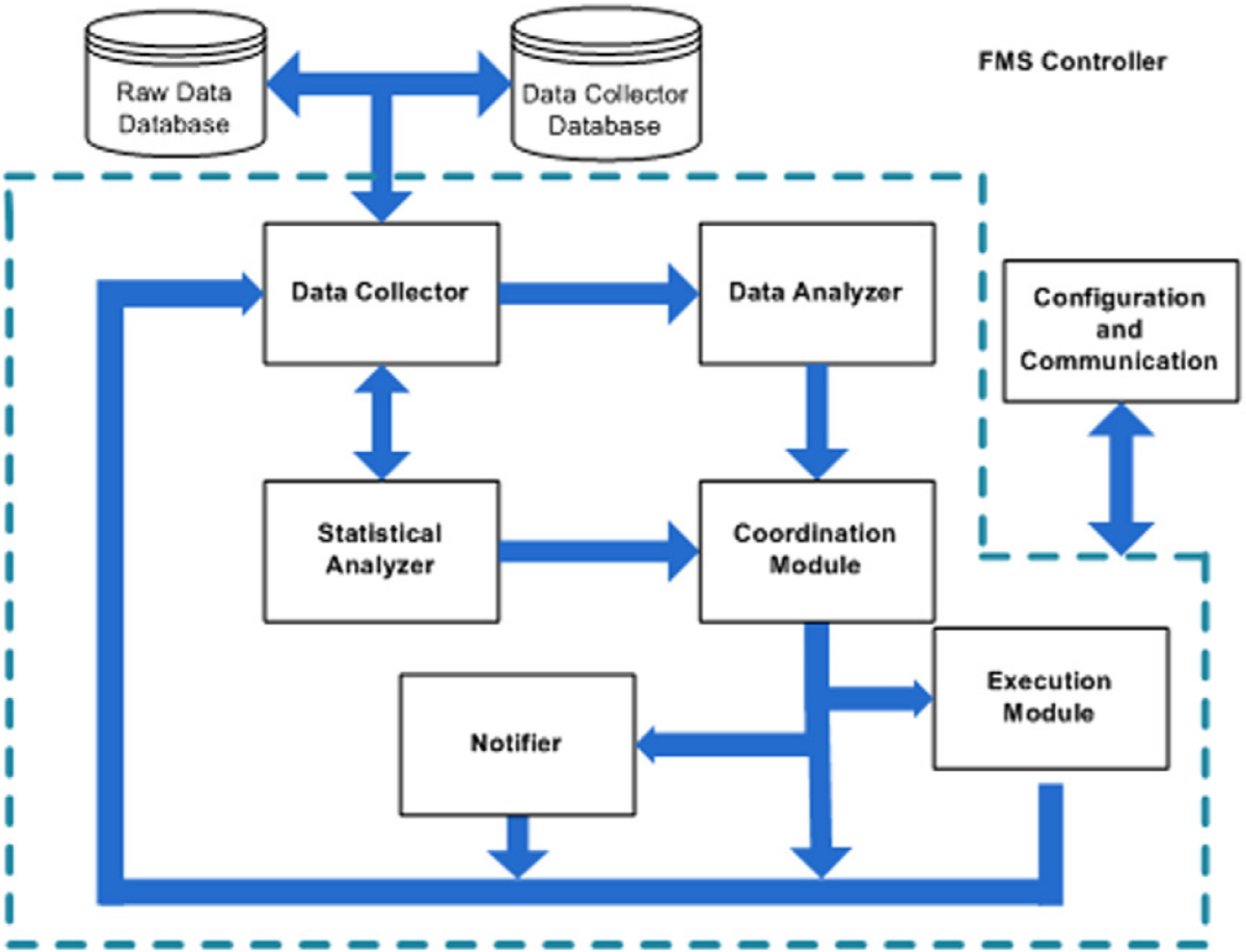
Data
Selected Indicators
Compare Data
Rankings
Definitions and Standards
FAQ
Search an Indicator or Commodity
Data
DOMAINS
DOMAINS TABLE
Production
Food Security and Nutrition
SDG indicators
Food Balances
Trade
Prices
Cost and Affordability of a Healthy Diet
Food and Diet
Population and Employment
Investment
SDG indicator
Macro-Economic Indicators
Food Value Chain
Climate Change: Agrifood systems emissions
Forestry

Data Store

- Database Management System (DBMS, e.g., MS ACESS)
- Enterprise Resource Planning (ERP)
- Structured Query Language (SQL)

DBMS


Raw Data Database
Data Collector Database
FMS Controller
Data Collector
Data Analyzer
Configuration and Communication
Statistical Analyzer
Coordination Module
Notifier
Execution Module

DBMS

Functional block	Supported functionality
Raw Data DB	– Used for storing raw data as collected from the sensors, farming machinery, tracking systems, external services e.g., meteorological data – These data are the property of farmer and can use them when switching from one FMS provider to another
Data collector DB	– Used for placing all processed data (e.g., after statistical processing of raw data) and information related to a farmer (e.g., advices from an advisory system, executed actions, the results of these actions, etc.) – It contains knowledge produced by the cognitive cycle (monitor, decision, execution, learning) or directly by a stakeholder (e.g. farmer, machinery manufacturer). Knowledge storage in the database is similar to the paradigm applied in the case of text-mining (Chakrabarti, 2002). During the latter, text is represented as a vector and associated with a class which in turn can be associated with any set of actions (i.e. web search). Following the analogy, in our case, knowledge is represented as a vector that can be classified and associated with any set of rules or actions
Data collector	– Used to transfer data to and from the Data Collector Database and the Raw Data Database – Provides information for further processing to the Data Analyzer and the Statistical Analyzer module and also communicates with the Notifier.
Data analyzer	– Involved with the processing and analysis of different types of data and different types of context. It contains a multimedia analyzer. – Checks periodically if some rules are violated or not – Checks if some received values are not inside an expected range – Communicates with the coordination module and the statistical analyzer
Statistical analyzer	– It processes an amount of data using statistical functions – Uses data mining techniques to inform about the system's performance – Used to identify malfunctioning farming machinery or equipment (e.g., sensor).
Coordination module	– Receives input from the Data Analyzer and the Statistical Analyzer and has the "intelligence" to handle simple situations (e.g., temperature increase inside a greenhouse) – Coordinates the decisions reached by services the farmer is currently using – Responsible for conflict resolution among services – Triggers the execution module and the notifier. – It is configurable from the Statistical Analyzer module or directly from external entities (e.g., farmers, equipment manufacturers) since it allows them to install "knowledge" in the form of pre-defined rules
Notifier	– Used to inform stakeholders (e.g. farmers, buyers, spraying contractors, agriculturists, etc.) – Adapts any type of information to an appropriate form for end-user's device
Execution module	– Used for actions that can be executed automatically (e.g. open the windows start the ventilation system, initiate a firmware update, etc.). For those actions that cannot or the farmer wishes not to be executed automatically, the Notifier is responsible to inform the farmer with the appropriate information
Configuration and communication	– Sets the communication channels to collect raw data from the sensors and the farming equipment/machinery – Communicates with services provided from other parties – Used to configuring all other modules of the system (e.g. set a threshold to the Data Analyzer) – Is responsible for authentication an authorization – Is the message dispatcher for all other modules of the FMS controller

ERP

SUPPLY CHAIN MANAGEMENT
FINANCIAL MANAGEMENT
MANUFACTURING
BIG DATA ANALYTICS
ERP
INTERNET OF THINGS
BUSINESS INTELLIGENCE
PROJECT MANAGEMENT
ASSET MANAGEMENT
CUSTOMER RELATIONSHIP MANAGEMENT
HUMAN RESOURCE MANAGEMENT
SERVICE MANAGEMENT
SALES & MARKETING

SQL

ORACLE
DATABASE

MySQL

PostgreSQL

Microsoft
SQL Server

MariaDB

SQLite

Cloud
Spanner

IBM
DB2

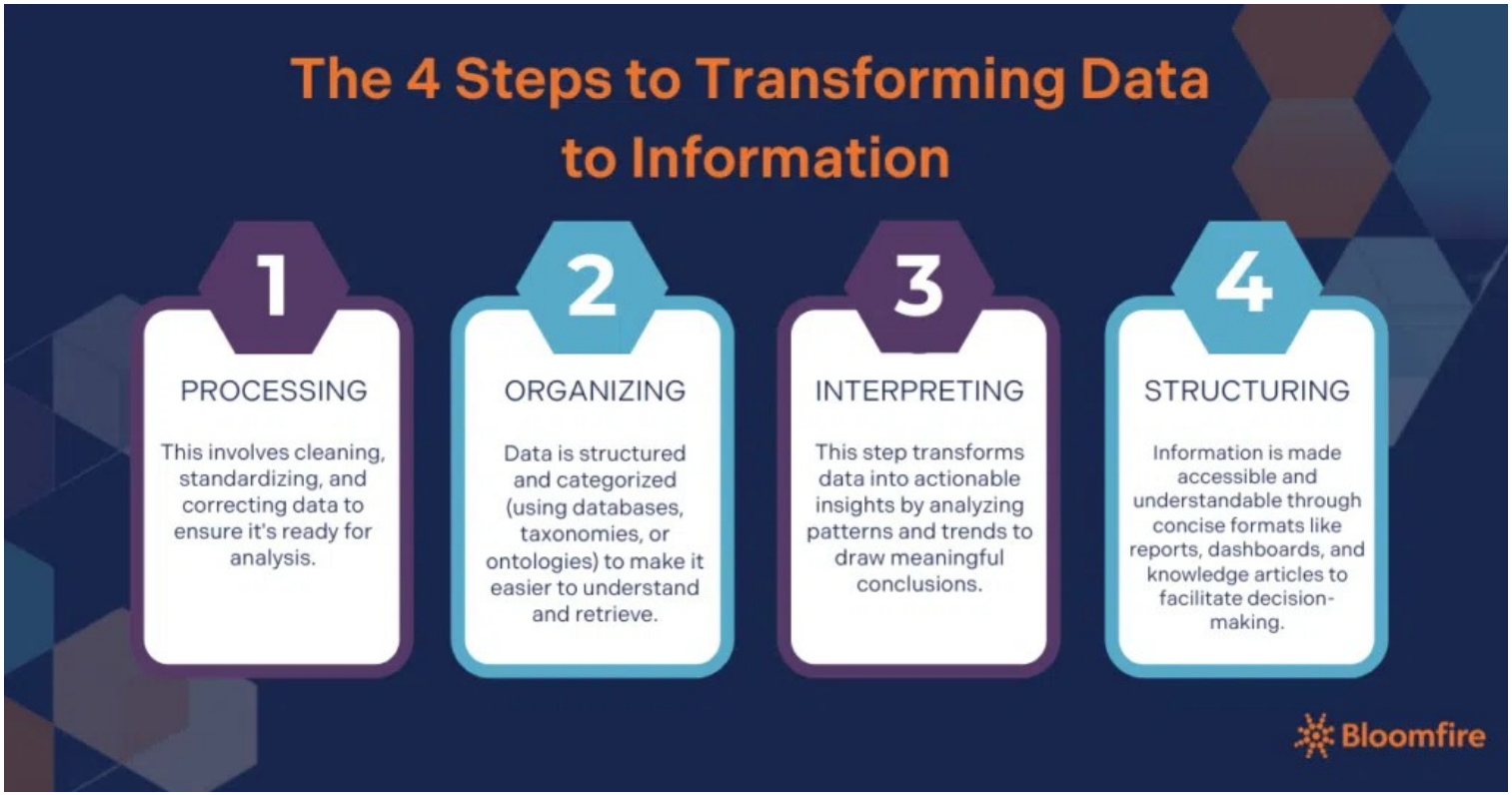
Data Analysis

- Data: Raw, unorganized (unprocessed) facts that need context to become useful
- Information: Processed, organized, interpreted and analyzed data used for specific purposes (e.g., descision-making) by adding meaning and value
- Data is used for information, which is also can be used for other information.

Details: Data

- A collection of facts or statistics
- Unorganized
- Without context
- Can be quantitative (descriptive)
- Examples: Number of Farmers in South Korea, Agricultural Income per Farm Household, Rice prices, etc

Details: Information

- The result of analyzing and interpreting data
- Has context
- Can be used to help make decisions
- Examples: An increase in rice prices compared to previous year, Average agricultural income in Jeonnam and Jeonbuk with a comparision, etc

Data Analysis